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**Representative  
of Every Interest**

# The Citrus Industry

**Representing  
No Special Interest**

**Planting and Thinning Prac-  
tices For Maximum Production  
—A Look Into The Future**

**Ability To Produce Increasing  
With Each Passing Year**

**26th Citrus Growers Institute  
Program Announced**

**The Use of Wind Machines for  
Frost Protection of Florida  
Citrus 1958-59**

**The Expanding Citrus Industry**

**Florida Citrus Mutual Holds  
Annual Meeting**

**Citrus Nursery Site Approval  
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The Citrus Industry Magazine  
Bartow, Florida

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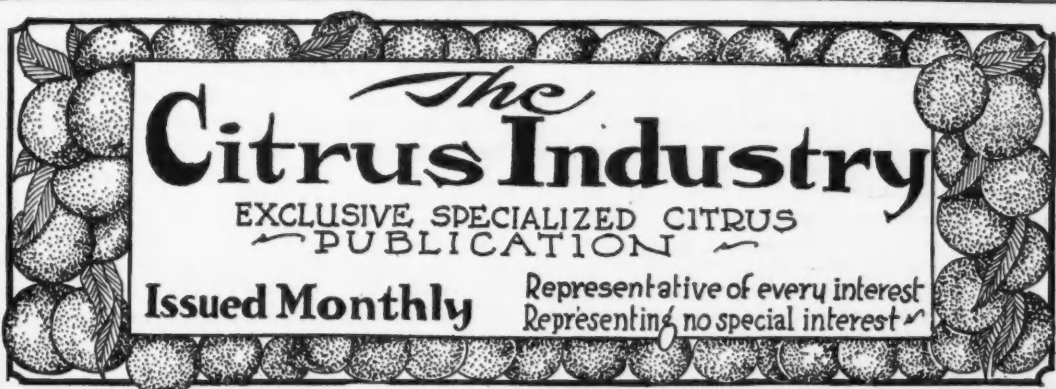
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# The Citrus Industry

EXCLUSIVE, SPECIALIZED CITRUS  
PUBLICATION

Issued Monthly      Representative of every interest  
Representing no special interest ✓

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## Planting And Thinning Practices For Maximum Production ... A Look Into The Future

Soothsayers and crystal ball gazers are of no value among citrus growers to point up the fact that adjustments are needed to remedy some serious problems in groves resulting from close spacing of trees. Yet it is a recognized economic necessity that growers, confronted with ever-increasing costs of land, taxes, materials and services, must maintain the highest possible production and quality potential on each acre planted to citrus.

Growers of most tree fruits in general, and of citrus fruits in particular, have long recognized that close spacing of trees resulted in increased fruit production during the early years following the planting of the grove. Most growers calculate to alleviate the crowded condition in their groves by the removal of certain trees once the trees become sufficiently large to interfere with the normal growth and development of each other. But when the time for removing them actually comes about the thought of removing healthy trees induces severe mental anguish among growers and less painful measures for overcoming the problem are sought.

There are numerous methods of managing closely set trees. In this paper it is proposed to briefly discuss the following:



**R. E. NORRIS**  
Lake County Agricultural Agent

1. Hedging
2. Thinning by tree removal
3. Topping or "buckhorning"
4. Close spacing and subsequent thinning

1. Hedging is one means of alleviating the crowded condition in groves. It was used by a few grow-

ers in the early '50's and has gained in popularity in recent years. It is especially advantageous in tangerine plantings where the percent of packout is generally increased substantially due to the increased fruit sizes beginning the first year after hedging. The practice is popular also in orange and grapefruit plantings. Production is generally reduced for from 1 to 3 years following hedging in these varieties, but the practice results in better sizes, better rind color, higher solids and cleaner fruit. The hedging operation opens tree middles thus enabling the more effective operation of tractors, spray rigs, fertilizer distributors, discs and picking crews and allows more light in the tree middles which results in better cover crops.

More information on the general subject of hedging and the equipment used for the work may be found in Extension Service Circular 115 and Experiment Station Bulletin 519.

Hedging generally costs from 10 cents to 75 cents a tree depending on the type of equipment used in the hedging operation, the size of the trees, amount and size of the brush and how its disposal is handled.

### 2. Thinning by Tree Removal

Two separate operations in which thinning by tree removal has been practiced will be discussed briefly.

Grove A is a 20-year old Hamlin block budded on rough lemon root-

\* Presented at the 6th Annual South Florida Citrus Institute. Camp Cloverleaf, June 3, 1959.

stock and spaced 15 x 25. The soil is a deep phase of Lakeland fine sand. The trees were never hedged or otherwise pruned back. The limbs had interlocked badly and were dying as the result of shading. During the 5 seasons prior to the tree removal operation fruit production decreased markedly.

During January and February, 1956 every other tree in the 15-foot row was removed. The wood under 4 inches in diameter was run thru a chipping machine and the chips were incorporated into the soil. The stumps were removed with a bulldozer.

The grower estimated his labor cost for removing these trees at \$1.50 per tree.

See Table II for yield records.

Grove B is an 18-year old Valencia block budded on rough lemon rootstock. It was planted 15 x 30 on a good grade of Eustis fine sand.

The operation involves the removal of alternate trees in the 15-foot spacings. Only 50 trees a year are removed from the block so as to avoid a serious reduction in the crop in any one year.

Comparative yield data (before and after thinning the stand of trees) are not available for this grove because trees have been removed from the block every year from 1953 to and including 1959. However, close inspection of rows from which the alternate trees were removed in 1953 and 1954 indicates that the trees left in place have thus far not gained increased production by virtue of having been allotted increased space. It should be pointed out that the limbs of the trees were becoming interlocked prior to the time the alternate tree removal operation commenced and

had these trees not been removed, crowding would have seriously hampered production by this time, it is believed.

In this particular operation, the trees that were removed have all been replanted in other parts of the grove. This has been an interesting operation and will be reviewed briefly here.

The trees to be removed are first "buckhorned" and then pushed and lifted out with a bulldozer equipped with a rake blade. As soon as the

tree is lifted out by the bulldozer a tractor equipped with a crane takes the tree and holds it suspended while all ragged roots are pruned off. Five such trees are loaded on a tractor-trailer outfit and taken to the new location. The trees are set in with 175 gallons of water and whitewashed immediately with a concrete paint-type durable whitewash. The trees are watered once a week if ample rain does not occur.

This operation has proven to be

Table I Effect of Hedging on Percent of Pack-Out on Several Representative Groves

Tangerine /RL Age: 30		Lakeland Fine Sand Planted 26 x 26	
Picked (Boxes)		Packed (Boxes)	% Pack-out
1949-50	6087	2207	36.25
	Hedge on 2 sides in Feb. '50		
1950-51	3584	3005	84.31
1951-52	7908	6588	83.31
1952-53	3970	3570	89.92
1953-54	8634	5024	58.81
	Hedged on 2 sides April '54		
1954-55	3992	3366	84.31
1955-56	6171	5073	82.20
	Hedged on 2 sides Jan. '56		
1956-57	3422	2373	69.34
1957-58	816 (Freeze)	478	58.57
		8-Year Avg.	75.34

Grove B Eustis Fine Sand Planted 20x20 (Diamond)		Hamlin /RL Age: 21	
1949-50	2307	All Cannery	0
1950-51	2125	1197	56.32
1951-52	2663	1800	67.59
	Hedged on 2 sides Feb. '52		
1952-53	2518	657	26.09
1953-54	2763	1672	65.13
	Hedged on 2 sides Jan. '54		
1954-55	1995	1338	67.06
1955-56	1445	1068	73.90
1956-57	1971	1132	57.43
1957-58	2609 (Freeze)	1280	49.05
		6-Year Avg.	56.44

Grove C Duncan Gft/RL Age: 19 years		Lakeland Fine Sand Planted 28 x 28	
1953-54	1142	259	22.66
1954-55	1997	1166	58.39
1955-56	2975	1451	48.77
	Hedged 3 sides in Feb. '56		
1956-57	2497	1284	51.42
1957-58	3006	1680	55.88
1958-59	2904	1079	37.22
		3-Year Avg.	48.10

Figures: Courtesy Lake Region Packing Assn.



Figure 1. The Problem. Close set seedling trees canopy and become unproductive. Harvest costs are high.



Figure 2. The Solution. Close set seedling trees are sometimes cut back to the ground, or, more frequently, cut off at waist height. New growth is extremely vigorous.

extremely successful. Here are the costs:

"Buckhorning", white washing wound dressing on cuts, brush disposal, etc. (See under "Topping" in Section 3 for details) \$10.40

4 men 9 hours to move and set 15 trees - 2.4 men hours per tree.

Bulldozer 10 minutes to dig tree and refill hole. Tractor and supply units used about 4½ of the 9 hours.

Tractors without drivers about \$2.00 per hour.

Supply unit with driver about \$2.00 per hour.

Bulldozer 5 minutes to dig hole to set tree.

Cost per tree:

From above	\$10.40
Labor	2.40
Tractor & Supply unit	1.80
Bulldozer	1.00
Grand Total	15.60

3. Topping ("buckhorning") is here used to refer to a type of rejuvenating pruning. It describes the method used to revert an old block of low production seedlings to a much greater production without removing any of the trees. It involves the removal, in this case, of all wood from about 5 to 5½ feet above the ground. Some trees were cut at ground level. This type of severe pruning results in sufficient loss in wood and foliage to stimulate

new growth over the remaining portion of the tree.

In many seedling blocks limbs have so overlapped that insect and disease pests together with a lack of sunlight in the lower part of the trees has resulted in a gradual dying of the lower limbs. In some old seedling groves it is 10 to 15 feet from the ground to the first limb. The tops are sparse, the foliage small, production is down and picking costs (usually from a 40-foot ladder) are decidedly up.

In the seedling block referred to here the trees are "Buckhorned" in solid blocks. A power saw is used and the cuts are made at the height most convenient for the saw operators. This is generally in the 5 to 5½ foot range. All cuts are treated with a heavy coat of water emulsifiable asphalt paint. The trunks are whitewashed immediately with a durable, waterproof cement paint. The brush is pushed out with a bulldozer and burned.

Within six weeks the trunks are sprouting vigorously. All sprouts except the uppermost 3 or 4 on each large stub are rubbed off. This forces all growth into the top of the stubs and reduces the amount of decay that would subsequently occur if the lower branches were allowed to grow.

The growth near the stubs on the stump is very thorny. Terminal growth on the ends of the new growth is broken off by hand or cut by sickle at intervals to force the new growth to branch out and make a full headed tree quickly. The thorns continue to appear on the new growth and are so severe that inside pruning or training is impossible. Nature provides her own pruning for these trees as many branches are shaded out as the tops become more full and dense.

As the new growth gets older and longer the thorns begin to disappear in those parts of the tree.

Trees that are cut off at the surface of the ground grow out very rapidly also. They are more "squatty" than those cut higher. These trees as well as those cut off at 5 to 6 feet high grow back resembling budded trees. Trees cut from 10 to 15 feet above the ground assume the appearance of seedlings. The reason for not adopting the procedure of cutting the trees at the ground surface is that in such cases a large stump diameter exists much of which will eventually rot out regardless of the care exercised in the subsequent management of the stumps after cutting.

It took 5 years in this grove for trees to reach commercial production after topping.

#### Cost Per Tree

Saw twice (with Chain Saw, then Reciprocating Saw, to "finish" cut)  
2 men ½ hour, 1 man hour

Whitewash, 1 man, ¾ hour, ¾ man hour

Wound dressing, 1 man ½ hour, ½ man hour

*Continued on page ten*

Table II  
Grove A

Yield Records Before and After Tree Thinning Hamlin Oranges on Rough Lemon Rootstock Planted in 1937	
Before Tree Thinning 15 x 25 Tree Count 1170	Planting Distance After Tree Thinning 25 x 30 Tree Count 598
Soil Type: Rolling Phase of Lakeland Fine Sand	
Yield in Field Boxes	
1950 - 4476	1955 - 2886
51 - 5634	In January alternate
52 - 6400	trees removed
53 - 6679	56 - 3858
54 - 5084	57 - 4349
58 - 4255	

Figures: Courtesy Lake County Grower.



Figure 3. This seedling tree was topped at waist height. The picture was made 16 months after topping. New growth is very thorny, production very low.



Figure 4. This picture was made 24 months after the seedling tree was topped to waist height. Such a tree passes thru a juvenile period when new growth is rank and thorny and fruit is scarce. Commercial crops occurred on these trees 5 years after topping.



## Ability To Produce Increasing With Each Passing Year

I believe that most of us today are well aware of the increasing production potential of the American agricultural worker, that is, the ability of one man to produce more and better crops with each passing year. Sixty years ago it took five families to produce enough food to feed themselves and one other non-agricultural family. Between the two World Wars, this potential reached the point where one man was able to produce enough food for 12 people. Today, the American agricultural worker can produce food enough for 20 people.

Now, let's look into the cause of this. Why is it happening? There probably are many reasons, and to a certain extent they are all inter-related; but I believe most people would agree with me that perhaps three of the most important ones are these; first, our increasing knowledge of the soils, increasing knowledge of plant nutrition and what the plant requires, what to feed it, and when, and how.

The second one is bigger and better and more efficient machinery—machines that can do a better job than any man. Machines that can do the work of a hundred men. Certainly this is a most important part of our technological advancement.

A third factor, and I think probably the one we hear the least about, is our increasing awareness of the importance of what we start with. We have come to accept as inescapable, the fact that no matter how competent and well-informed the agriculturist may be, no matter how good his equipment or his soil, he must have good material to start, whether this be seeds, or tubers, sets, seedlings, or grafted trees. We also recognize that no matter how fine his source material may be, he cannot produce a satisfactory crop without giving that crop what it requires.

Today, all over this country, in every field of agriculture, the producer can turn to one agency or another and secure material that was selected to give him a better start. This applies to beef cattle, to registered poultry, to registered dairy herds, to registered or certi-

... By ...



GERALD G. NORMAN  
Citrus Budwood Registration Program  
State Plant Board

fied seed, and to registered or certified budwood or trees.

For the last twenty years the grower has been faced with a long cycle of increasing costs. The price of labor, material, land and equipment have gone higher and higher, and this apparently is going to continue.

In most cases, the citrus grower found that as the costs of production increased, he got a more or less comparable increase in his return from his crop. The man, on the other hand, who had to meet this increasing expense but had a decrease in production was in a very bad way indeed. In some blocks where the grower simply could not make a profit, there was an easy and obvious explanation (such as cold or water damage, poor soils, foot rot, etc.) - but in many cases it seemed that the only reason for these unproductive and unprofitable groves went back to what he started with. Trees that were off-type or variant, trees that were diseased, trees that were not of the variety they were supposed to be, and just plain poor trees lacking the necessary vigor and fruitfulness.

The Florida citrus industry felt that something should and could be

done about this. One of the answers to this problem is the State Plant Board's Citrus Budwood Registration Program. This program was started after almost two years of very careful planning by industry leaders, by technical workers, by growers, nurserymen, processors, and the men who lend money on citrus groves, in close cooperation with Plant Board representatives.

Now, what is this Program? What is its purpose, and what has it accomplished?

First of all, it is an organized plan to improve the quality of our budwood. In other words, to improve the quality of what we start with. The bud eye gives the young Citrus tree its horticultural and genetic characters. It establishes its potential vigor and productivity, and is all-important in the transmission of diseases. By definition, the purpose of this Program is, and I quote - "To assist growers and nurserymen to find trees that are vigorous, productive, true to type, free of evidence of any undesirable bud mutation, and free of blight, decline, gummosis, leprosis, psorosis, in any of its types, xyloporosis, exocortis, stubborn disease, or any other recognizable bud-transmitted disease."

When the committee and the Board wrote this Statement of Policy, they could just as easily have said that this is a program to help you increase the life of your trees, to increase the vigor and the yield of those trees, and to assure you that the trees you buy as Valencia, Hamlin, etc. will actually be that variety. They could have said that this is a Program to help you have a good, profitable grove. They could have said that this is a plan to help you get the best possible start in a lifetime investment.

Today, the Budwood Program is cooperating with 158 nurserymen and growers in the State. The production of nursery stock represented by these 158 participants is approximately 80% of the total citrus nursery stock produced in the State. This does not mean that 100% of the present production of these nurseries is registered stock. It does mean they are in the Program and are on their way - so that eventually a very high percentage



of their total output will be registered.

In addition, we have a total of 81 scion groves comprising 19,719 trees propagated from registered parents. These trees can now, or in the near future, also be used as sources of registered budwood.

This year the State's nurseries will produce 490,000 registered trees.

You might also be interested to know that while the 158 participants in the Program produce 80% of our nursery stock, the remaining 20% is produced by 942 different nurseries.

I would like to quote from an article published by a citrus research worker in the California citrus magazine, *THE CITROGRAPH*: "In this area (he is speaking of Northern California) the average yield reduction from citrus virus diseases probably exceeds 20%, and in certain individual orchards, average annual loss is at least 50%. Prevention is the best control for most citrus viruses. The current and long-standing heavy losses from virus diseases need not be repeated in future plantings if present technical knowledge is properly used to obtain virus-free selections of our best citrus varieties for propagative material."

This magazine has also said, "Florida has a well-organized and well-supported Budwood Program to eliminate these virus diseases. The virus diseases are a luxury that the California grower can no longer afford."

Now, what of the future? Where do we go from here?

We believe that our Budwood Program went through its First Phase in the first six years of its operation. During this time literally hundreds of thousands of trees were examined. Some 3600 were accepted as potentially satisfactory candidates. Out of these 3600, 1400 survived. Very probably a thousand will make the grade and become registered.

We believe that the time has come now for the Second Phase of this work. That is, to take the best of the best trees of each variety, with the owner's permission, and to plant them side by side across a representative group of commercial rootstocks - on the same soil and where they will have equal cultural care. This will accomplish two things. First, we will know which is best when put in competition with other fine trees of the same variety. It will also give us an opportunity to make critical appraisal and evaluation of these various clonal sources where the difference in even one or two per cent higher solids could be detected. As it is at present, we do determine that the trees we take into the program are vigorous and productive; however, they are not our trees and we cannot weigh or measure the fruit as it is picked. We can run maturity tests on small quantities of the fruit at different seasons of the year, but it is almost impossible to compare the quality of a Valencia orange on Sour rootstock in the Indian River area with a Valencia orange on Rough Lemon rootstock on a Polk county sandhill. There-

fore, we feel that the time has come now for the State Plant Board to begin to select from our old line trees the very best of the trees we have screened, watched and tested during the past six years. There are some people who object to this, and they say that the State should not be in the budwood business. It is not the Board's intention to supply any nursery or any grower with any large quantity of budwood, but simply to give them a good start. This foundation planting, or this budwood bank, has a value in that we not only can determine that these trees are virus free, but we can, in a central location, run continuous tests on them to see that they remain virus free, and this is particularly important as far as tristeza is concerned.

This will also give us opportunity to distribute budwood in small quantities to participants in the Program. It will give a man who does not have a parent of one variety an opportunity to establish a scion grove. It would solve the problem of foundation material stock for the small nurseryman who has been late in entering the Program. In many ways it would be easier for us under this system to give a nurseryman small amounts of budwood than to explain to him why, under the present set-up, we cannot.

In addition to the old line trees entered by participants in the Program, the Plant Board has, in its Winter Haven test plot, wood from several hundred out-standing seedling trees. Some of these are ma-

*Continued on page eleven*



## PLANTING AND THINNING PRACTICES FOR MAXIMUM PRODUCTION . . .

### A LOOK AT THE FUTURE

*Continued from page seven*

Cost of whitewash (durable cement) .50 per tree

Cost of wound dressing, .15 per tree

Haul brush (500 ft. from grove)



Figure 5. This seedling tree was topped 14 years ago. It is a high producer. Notice that it has the appearance of a budded tree.

4 trips per tree, 1 hour man and tractor (\$2.00 per hr.)

Trees are pruned twice a month for first year to force sprouts out as near the end of the limb as possible -

Cost per month, ½ man hour per month

Tall sprouts should be topped to prevent wind damage and encourage branching.

Total cost at \$1.00 per hour for labor \$10.00

See Table III for yield records.

**Table III Production Record of a 10-Acre Seedling Block Cut Back to Waist Height**

	Boxes	Boxes
Before	1946 - 3017	1953 - 397
cutting	47 - 2652	54 - 722
back	48 - 2801	55 - 1120
Trees	49 - 2399	56 - 1503
Cut	50 - 1862	57 - 2926
Back these	51 - 958	58 - 4872
years	52 - 385	

Figures: Courtesy Lake County Grower.

#### 4. Close Spacing and Subsequent Thinning

Per acre production of citrus fruits is increased in almost direct

proportion to the number of trees set in a grove. This relationship generally exists until such time as trees begin to become crowded provided ample fertilizer, moisture and pest control measures are maintained in the grove.

As has been previously pointed out, growers recognize the value of close spacing of trees, but gener-

solutions to the problem of crowding. Another possible solution to this problem has been suggested and is being used on a trial basis by a number of growers.

This newer practice suggests the close spacing of trees, say 15' x 25'. As the trees begin to grow together, the alternate trees in the row are hedged just enough to leave a frame of light around the tree. This procedure is followed each year. A light hedging job is done on the same alternate trees. Only enough hedging is done each time to create a "frame of light" around the tree. All hedging operations each year are continued only on the alternate trees in the row. Half of the trees are never hedged. By the time that the alternate trees are hedged to their trunks they no longer have a bearing surface worthy of consideration and there is no mental anguish on the part of the grower in removing them.

During the years that this operation is progressing the grove is giving maximum yields and ultimately the spacing of the large trees is 25 x 30.

Another advantage of the "frame of light" around the alternate trees is that air drainage will be improved throughout the grove.

Zach Savage has prepared some figures which show the relationship between yields of trees planted at 25 x 30, 15 x 25 (alternate trees not hedged) and 15 x 25 with alternate trees hedged. His figures are shown here:

#### Conclusion

1. Growers generally follow the

**Table IV Orange Production At Two Setting Distances, 25'x30' and 15'x25'**

Age of Tree	Average Yield		Total Yield		Age Group	Cumulative Yield	
	25'x30'	15'x25'	25'x30'	15'x25'		25'x30'	15'x25'
5 to 9	79	158	395	790	5 to 9	395	790
10 to 14	135	270	675	1,350	5 to 14	1,070	2,140
15 to 19	178	310	890	1,550	5 to 19	1,960	3,690
20 to 24	221	310	1,105	1,550	5 to 24	3,065	5,240
25 to 29	264	300	1,320	1,500	5 to 29	4,385	6,740
30 to 34	299	280	1,495	1,400	5 to 34	5,880	8,140
35 to 39	341	255	1,705	1,275	5 to 39	7,585	9,415
40 to 44	386	220	1,930	1,100	5 to 44	9,515	10,515
45 to 49	434	180	2,170	900	5 to 49	11,685	11,415

Estimated orange production on setting 15'x25' with alternate trees pruned to make room for remaining trees, with stumps removed at approximately 40 years of age, leaving trees 30'x25'.

Age of Tree	30'x25' Trees	Alternate Trees	All Trees	Total Yield	Age Group	Cumulative Yield Combined 15'x25' 25'x30'	
						15'x25'	25'x30'
5 to 9	79	79	158	790	5 to 9	790	395
10 to 14	135	135	270	1,350	5 to 14	2,140	1,070
15 to 19	178	135	313	1,565	5 to 19	3,705	3,690
20 to 24	221	125	346	1,730	5 to 24	5,435	5,240
25 to 29	264	100	364	1,820	5 to 29	7,255	6,740
30 to 34	299	75	374	1,870	5 to 34	9,125	8,140
35 to 39	341	35	376	1,880	5 to 39	11,005	9,415
40 to 44	386	0	386	1,930	4 to 44	12,935	10,515
45 to 49	434	0	434	2,170	5 to 49	15,105	11,415

15-year Average  
Deficit as compared to combined group, 5 to 49 years  
Relative yield over period with combined group as 100  
Relative yield 5 to 39 years with combined group as 100  
Deficit as compared to combined group, 5 to 39 years  
Data from studies of the Florida Agricultural Extension Service and Experiment Stations, Gainesville, Florida, combined with estimates.  
ZS/ep 1-7-59 - 400

The above information prepared by Zach Savage, Agricultural Economist, Florida Agricultural Experiment Station.

practice of close spacing of trees to attain maximum fruit production.

2. High production is actually attained generally only so long as the branches of one tree are not interlocked with those of its neighbor.

3. Any one of several practices including hedging, thinning and topping, has improved production and quality of fruit in the groves studied.

4. Hamlin groves recovered their production levels more quickly than Valencias following thinning operations in the groves studied.

5. 27-year old Valencia trees on rough lemon rootstock have been transplanted bare-rooted very successfully by pushing and lifting the trees with a bulldozer and setting them in the new location in a similar soil type. The procedure has not been as successful in moving trees of the same age and variety on sour orange rootstock.

6. Recovery of transplanted budded Valencia trees is very rapid as is the recovery of topped (buck-horned) seedling trees, but the budded trees resume fruit production much more quickly.

7. It is acknowledged that the data herein presented is too limited to be of practical value. It does, however, fairly illustrate the trends observed by field study of groves receiving the various treatments described.

#### A TALK BEFORE THE GULF CITRUS GROWERS INSTITUTE, DADE CITY, APR. 24

*Continued from page nine*

ture trees that could be developed rapidly and might become sources of budwood for Phase 3 of this Program. Certainly the nucellar seedlings have great promise. They appear to be good. We believe they are good. But we are not going to abandon the old lines, which, with all their troubles, have still made a good living for us, until we can conclusively prove that nucellar buds are superior to the very best of the old lines.

Some of you will be buying registered trees in the near future. All these trees are vigorous, commercially productive and true to type. Bud mutation has been kept to minimum. There are three categories of registration; one for psorosis only. Nursery stock in this category bears a State Plant Board seal for freedom from psorosis only. There is a second category, for freedom from psorosis and xyloporosis. There is

a third category for freedom from psorosis, xyloporosis and exocortis. We do not register trees for freedom from tristeza because tristeza is not only bud transmitted but can be transmitted by insects. I do want to make this point, however. No trees are taken into this Program until they have been tested and found to be free of tristeza virus. However, we cannot guarantee that they will remain free.

Not only is the parent tree tested for these viruses, but the nursery stock propagated from these trees and the scion trees propagated from trees are all observed each Spring for continuing freedom from psorosis and other possible trouble.

We cannot make any warranty as to virus freedom of any of these trees because this work, at least on this scale, has never been done before. Most experts feel that when working with anything as obscure and unpredictable as the citrus viruses, about 98% accuracy is the most that can be expected.

Out of the 3600 trees we have worked with so far, we have, so far as we know, made only four errors. In one case, a parent was actually declared eligible for registration, but before the grower could register the tree or propagate from it, the test

trees finally showed psorosis leaf patterns. If this ever happens to you, I hope you will remember that this does not take anything from the 99%+ of your registered trees that are virus free.

The last word that I would like to leave with you is this. If you are buying registered trees, beware of the nurseryman who says that his budwood came from trees that are just as good as registered trees. If they are registered trees, they will bear the Plant Board seal. This is your only positive assurance that you are buying trees that have been registered. Just as you have a right to expect a fertilizer tag on every bag of fertilizer you buy, you have a right to expect a Plant Board seal on every registered tree you buy. Without Plant Board seals, we make no certification whatever as to the source of the budwood.

Aging poultry at least 12 hours before freezing increases its tenderness according to U. S. Department of Agriculture research. And birds aged before being cut up are more tender than those aged afterwards. Scalding above 125° F. also reduces tenderness.

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# Florida Citrus Mutual Holds Annual Meeting

At the 11th annual meeting of Florida Citrus Mutual held in Winter Haven, June 16th, considerable attention was devoted to informing the some 2500 growers in attendance of the necessity of looking to the future of Florida's great citrus industry.

It was pointed out that citrus growers generally have enjoyed exceptional prosperity for the past few years, and there was need for further research and study to insure a continuation of this prosperous period throughout the years to come.

Vernon Conner, Mutual's president, called for a "concentrated stepped-up industry research program" to develop new citrus products and new uses for present ones.

He also asked growers to contribute to a \$200,000 campaign to provide a new site for the U. S. Department of Agriculture's Florida horticultural station.

The station, which works toward developing better citrus varieties, has lost its lease in Orlando. Mutual's directors decided after the membership meeting to donate \$10,000 to the drive.

In a special report, Robert W. Rutledge, general manager of the organization, predicted the nation's growing population and national income will provide profitable markets for the larger crops expected in the future.

## Predicts Profits

He presented data which predicted \$380 an acre profits for orange growers in 1970 and \$200 an acre profit for grapefruit growers.

By then, Rutledge predicted, Florida will be producing between 122,000,000 and 137,000,000 boxes of oranges, depending on weather conditions.

A 40,000,000 box grapefruit crop in the 1969-70 season was also predicted. "More people with more money to spend," will provide markets for the increases, Rutledge predicted.

He did not predict the size of next season's orange crop, except to say it will probably be "about the same or perhaps little more" than this season.

This season's orange crop is now expected to pick-out around 87,000,000 boxes.

## Long Range Easier

Somewhat jokingly Rutledge con-



**VERNON L. CONNER**

*Reelected President of Florida Citrus Mutual For Fourth Term*

ceded it is easier to predict crop sizes 10 years from now than in two weeks "because two weeks catches up with you sooner."

Rutledge, as well as many others in the industry, has been wrong about the size of this season's late-season Valencia crop.

"All those rains made the Valencia grow," he said.

The grower spokesman warned Mutual members that their crops aren't sold when they are picked or accepted at processing plants.

## Sold When Consumed

"Fruit is not actually sold until it is consumed and used," Rutledge said.

This year's inventory of citrus product amounts to about 86,000,000 boxes of oranges and grapefruit, he reported. This is less than two years ago but more than last year.

Rutledge said lack of suitable land will limit the rate of Florida's expanding citrus production.

Florida's citrus groves in 1970 will total 700,000 acres, he said, about 90,000 acres more than are currently planted.

After the meeting Mutual directors reelected Conner for a fourth term as president and continued all other officers.

Ford Moody of Palm Harbor was

named a new member of the executive committee.

The directors also voted to continue Mutual's assessment at three-quarters of a cent per box.

Conner reported Mutual now has 9678 members.

## 75,000,000 GALLONS OF FROZEN ORANGE CONCENTRATE THIS SEASON

Florida citrus processors will pack approximately 75,000,000 gallons of frozen orange concentrate for the season, Robert W. Rutledge, Florida Citrus Mutual general manager, said in a current report of frozen orange concentrate.

Rutledge said Mutual has raised its concentrate pack estimate from 70 million gallons to 70 million gallons of concentrate due to "a revision in crop size and the all-time record yield of concentrate per box of oranges."

"It is certainly indicated right now that Valencias will overpick the amount of the government crop estimate by approximately 1,000,000 boxes," Rutledge said.

The estimated 75,000,000 gallons of concentrate for the season plus a carry-over from Dec. 1, 1958; of 6,500,000 gallons amounts to 81,500,000 gallons of concentrate.

Rutledge said less an estimated Dec. 1, 1959 inventory of 11,000,000 gallons of concentrate, these figures indicate Florida has 70,500,000 gallons of concentrate to sell.

"The 75,000,000 gallon concentrate pack simply means that the industry will have to carry-over approximately 11,000,000 of frozen orange concentrate as of Dec. 1, 1959, and that no further price advances in FOB quantities for concentrate will be necessary," Rutledge said.

## TWO MILLION SPOONS

Plaques commemorating Florida Citrus Mutual's distribution of the one millionth grapefruit spoon was presented at Mutual's annual membership meeting in Winter Haven, June 16, Robert W. Rutledge, Mutual general manager, said.

The famous spoon has taken the muss and fuss out of grapefruit eating and is now being used all over the country. Rutledge said over 2,000,000 spoons have been sold to date.



## 26th Citrus Growers Institute Program Announced

Symposiums on the result of applications of spray and dust materials by aircraft, the production of quality fruit and a discussion on the long time outlook for citrus will highlight the program of the 26th Annual Citrus Growers Institute at Camp McQuarrie Monday to Friday, August 10-14.

The annual citrus growers institutes are held at 4-H club Camp McQuarrie on the shores of Crooked Lake in the Ocala National Forest near Astor in north Lake County.

The Institute is directed by the Florida Agricultural Extension Service.

Lake County Agent R. E. Norris, the Citrus Institute manager, is announcing one of the best programs in the long history of the Institute. Technical workers, Extension Service personnel, industry leaders, growers and production men are all scheduled to appear on the program.

Reservations for the institute may be made now with R. E. Norris, County Agent, Tavares, Florida.

Moderate charges will be made for meals but housing will be furnished in the cabins without charge on the basis of the order in which reservations are received.

Persons staying over night at camp must furnish their own sheets, towels, pillows and other personal items. Men and women are housed separately and children are welcome. The institute affords an excellent opportunity for education, recreation and inspiration.

*Continued on page seventeen*

### FLORIDA CITRUS MUTUAL OFFICERS



Seated, left to right: A. B. Michael, Wabasso, Vice President Emeritus; Vernon L. Conner, Mt. Dora, President; James C. Morton, Auburndale, Vice President Emeritus; C. F. Fawcett, Jr., Orlando, Vice President.

Standing, left to right: W. M. Acree, DeLand, Treasurer; Charles C. Partin, Kissimmee, Secretary; Tom O. Brown, Frostproof, Vice President; J. J. Parrish, Jr., Titusville, Vice President.

# The Use of Wind Machines for Frost Protection of Florida Citrus 1958-59

## INTRODUCTION

This is a report on the most recent cooperative effort by the Federal-State Frost Warning Service and Lake Garfield Nurseries Company, Bartow, to ascertain the value of the wind machine as a means of frost and or freeze protection under Florida weather conditions. The results of previous investigations are available at the above address.

This report covers investigations at two locations during the 1958-59 season and only includes the nights that posed a threat to citrus.

## PLOTS AND INSTRUMENTATION

The first part reports on work in Lake Garfield Nursery at Babson Park. This nursery is on relatively high ground, where the terrain is rolling with numerous ridges and depressions. Thirteen thermometer stations were placed at varying distances from a 60 H. P. mechanically driven machine manufactured by Food Machinery Corporation. These stations, two of which were equipped with thermographs, were all within a radius of 425 ft. of the machine.

Some were on ridges and others in pockets, but the thermograph stations were at similar elevations and located 225 ft. and 325 ft. south of the machine. Two stations were placed in the outside check area. The one equipped with a thermograph was on terrain similar to the thermograph stations in the protected area and at similar elevation. The other was a thermograph station placed in a pocket.

All of the above instrumentation was approximately 18 inches above the ground in order to measure the temperature of the air at the average height of the nursery stock. In addition to the temperature stations a 32-foot inversion tower was constructed 325 ft. south of the machine being tested. This is within the area affected by the machine. Thermocouples - with leads to the base of the tower - were attached at 2, 16 and 32 feet. Temperatures at these levels were read by means of a manually balanced potentiometer.

The second part of this report summarizes our first studies on effectiveness of wind machines in protecting mature bearing grapefruit trees from critical temperatures. Temperatures were measured at

standard shelter height, 4½ feet.

Thermometer - thermograph stations were located 150 and 330 ft. east of a 25 H.P. electric FMC machine. The grove is in a nearly flat area with a slight rise toward the south and a slight fall toward the northeast.

However, the area under study could, for all practical purposes, be considered flat. The trees are generally 8-10 feet tall. The inversion tower in the protected area was 270 ft. southeast of the machines and about 30 feet tall. Thermocouples were placed approximately every two feet the length of this tower and fed to a twenty-point recording potentiometer. Thermocouples were calibrated and shielded on the top side. Numerous other thermocouples measured air temperatures in four trees and top and bottom skin temperature of fruit.

An anemometer, connected to a counter, measured the number of miles of wind which passed at tree top level 270 ft. from the machine. Similarly, the wind was measured in the outside check area located about 1200 feet north-northeast of the closest machine. A thermometer - thermograph station with another 30-foot inversion tower was also placed in the outside check area. The thermocouples on this tower were read with a manually balanced potentiometer and were placed at 4 foot intervals.

Throughout the graphic presentations one will notice occasional ir-

regularities which complicates the analysis; irregularities which make it difficult to quantitatively ascribe specific temperature contributions to the machines. For example; the temperatures at stations in the protected areas as compared to those in the outside check stations sometimes coincide during the hours prior to the time the machine was operative, at other times they did not.

Similarly, temperatures within the area to be protected varied during the same time. Unfortunately, these irregularities cannot be totally avoided in micro-meteorological studies outside the laboratory. In fact, the diminution of these temperature differences in space and time is a function the machine was meant to perform.

No fires were used in conjunction with the machines during any of the investigations this season. It has been mentioned in the body of the report where firing in the vicinity of the plots being studied could possibly have affected the temperatures of same.

## PART I

January 10-11, 1959 was an unfavorable night for operation of wind machines at the Babson Park Nursery. Figures 1 and 2 verify the estimated, almost constant wind velocity of 7+ MPH. There was practically no inversion here.

Note that both stations in the area of the wind machine were consistently about one degree colder than the check station until 1:25 A. M. when the machines were made operative.

On the basis of this difference the machine contributed about one degree rise at the station 325 ft. from the machine, since its temperature nearly coincided with that

By  
J. C. GEORG  
Entomologist

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of the outside check station for the remainder of the night.

It appears that the station 275 ft. from the machine received about 2 degrees benefit, as its temperature increased from 1 degree lower than that of the check station to 1 degree higher for the greatest portion of the remainder of the night.

Eleven additional thermometer stations scattered at distances of 75 ft. to 370 ft. from the machine, and located on high and low points, ranged from 28 to 29 degrees on the north side of the machine to 29 to 30 degrees on the south side.

A low ground check location, comparable to those in the machine area, reached a low of 27 degrees. This test substantiates a conclusion based on previous investigations, i.e., the machines provide little or no protection as the natural wind increases above 6 MPH. In this case they provided very little, temperaturewise.

January 17-18, 1959 was clear to partly cloudy at the Babson Park Nursery. Winds fluctuated 5 to 10 MPH with only very brief periods of calm. The outside check station was below 32 degrees for about 4 hours while stations within the area affected by the machine were below 32 degrees for only 15 minutes. This difference could be important within a more critical range of temperature. The machines were contributing 2 to 4 degrees between 9:00 and 11:00 P. M., little or nothing for the remainder of the night.

Between the hours of 5:00 A. M. and 8:00 A. M. there was nearly a 5 degree fall in temperature at all stations, and all went below freezing. The machine had been turned off shortly after 5:00 A. M. Evidently the natural wind diminished somewhat during these hours. At the Andre test area the machines were kept running during these hours and held the grove temperature up about 2 degrees above the outside area. This was enough to hold temperatures above 32 degrees - except for about 15 minutes - in the grove, while the outside check area continued down to a low of 30 degrees. The evidence mounts in support of continued operation of the machines where there is risk involved.

January 18-19, 1959 was clear and calm at the Babson Park Nursery except that there were brief intervals of very light wind after 2:00 A. M. In addition to the temperature data on Figures 5 and 6, eleven minimum check stations

scattered within 370 feet of the machine ranged from 29.3 degrees in the coldest depression northwest of the machine to 33.8 degrees 325 feet directly south of the machine. The rise in temperature at the check station, which was supposedly outside the effective range of the wind machine, bears a striking similarity to the rises which took place inside the area protected by the machine.

This station is about 1,000 feet from the machine. While there is no proof that the machine caused this rise, it would seem an extraordinary coincidence to attribute this to nature. However, this may have been the truth. Eight machines were operating in this nursery east of the outside check station, and it is possible that they influenced its temperature.

After the machine was turned on at 9:20 P. M., and the initial rise of about 3 degrees took place, note that the temperature did not fluctuate more than 1 degree inside the nursery for the remainder of the night. Official temperatures at standard shelter height were generally in the middle and high 20's this night in groves in this part of the country.

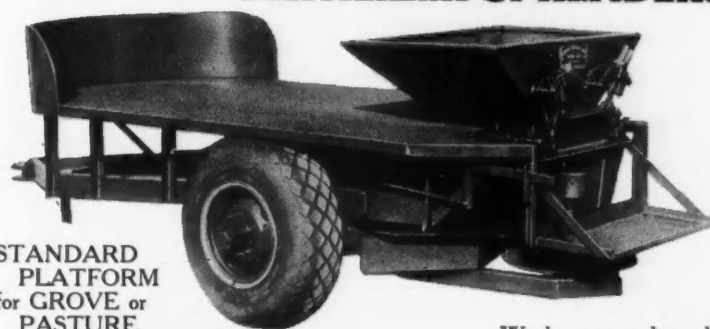
The machines probably did more good than evidenced from the graphs. A few cold pockets were fired in the nursery but all were remote from the test location. The warming trend the last half of the night was a rather general phenomena. However, the inversion was medium (5-8 degrees) much of the night, and the machines did a good job.

## PART II

January 10-11, 1959 was a clear night at the Andre test area. Winds were generally NW to N, 2 to 5 MPH with only brief periods of calm. The inversion was very small in the outside check area. Temperatures ranged from 32° at 2 feet to 33.5 degrees at 30 feet (11:30 P. M.) to 26.5 degrees at 2 feet to 29.5 degrees at 30 feet (5:30 P. M.). During the same period conditions were within one degree of being isothermal in the area affected by the machine except for a period between 5:00 A. M. and 6:00 A. M. when a 3 degree inversion existed.

At the station 150 ft. east of the machine the rate of fall was retarded to a small degree by operation of the machine. It appears to

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have contributed about 2 degrees at this location.

At the station 330 feet east of the machine (Figure 8) it is difficult to assert a positive benefit from the machine, as this station remained warmer than the check station during the entire period. This may or may not have been true had the machine not been used. During most tests this station was favorably affected to some extent by the machine. The station 270 ft. southeast of the machine was influenced most.

The persistency of this condition might be very important when locating machines in groves or fields. There was light frost on about 20 per cent of the foliage, and most of this was on the side opposite the machine. No defoliation resulted.

January 11-12, 1959 was a clear night at the Andre test area. Winds were very light, less than 4 MPH, with long periods of calm until 5:30 A. M. when they became constant at 4-6 MPH. The drift of the air during the so-called calm periods shifted throughout most of the night from east through north to west. These drifts, while not measurable with anemometry in use, had obvious influences on the temperature. Most of the temperature fluctuations as noted on the graphs for this night were caused by drift.

The inversion varied from 2 to 5 degrees (from 2 to 30 ft.) in the area affected by the machine during the operating hours. The magnitude of the inversion for the same number of feet in the check area was rather uniform at 6.5 to 7 degrees from 10:15 P. M. until sunrise.

From this it appears that the machine did a fairly good job of destroying the inversion out as far as 270 ft. especially after 3:00 A. M.

There was little difference in the benefit received at 150 feet and 330 feet east of the machine. This is a case where the 150 ft. station is by nature a little colder than the 330 ft. station and by no means infers that the machine is as effective at 330 ft. as it is at 150 feet. In fact the opposite has been true for any given direction in all tests except at this location. Frost was light and confined mostly to the soil in this grove. Frost on the trees in the area of the machine was insignificant. A heavy frost covered much of the surrounding area, both soil and trees outside the protected area.

January 17-18, 1959 was a clear and nearly calm night at the Andre

location until 9:30 P. M. For the remainder of the night it was clear to partly cloudy and winds fluctuated between 4 and 8 MPH measured outside the area affected by the machine. The benefit received from the machine varied from 1 to 6 degrees. The profiles at 2, 15, and 30 feet show that little inversion existed after 9:30 P. M. in the protected area. The inversion at the outside check station ranged from 5.5 degrees at 8:00 P. M. to 4.0 degrees at 1:50 A. M. when the last reliable reading was taken.

At 1:50 A. M. the inversion was only about 1 degree, 270 feet from the machine. The 3 degree difference in the magnitude of these two inversions under the influence of light, fluctuating velocities is nearly the same as the difference found on the following night when the inversion was large and there was no wind. Both nights experienced a warming trend the last half of the night; but for different reasons. Here is more evidence that some benefit is provided by the machines on nights with small inversions due to fluctuating light winds. However, the amount of protection one could expect under these conditions must still be resolved from other factors and will not always be similar.

The night of January 18-19, 1959 was clear and calm in the Andre grove. There were, however, intermittent periods when the drift of air was sufficient to stir the tops of tall grass and manifestations of the importance of these drifts are evident. They may cause the temperature to rise or fall at any given location, depending on the temperature upstream. Firing was heavy about two miles to the north of this grove from 1:00 A. M. until daybreak. During these hours there were periods when the drift had a northerly component; and with the good inversion that existed, it appears that some of this heat was transported several miles.

A continuous record of the verti-

cal temperature profile to the height of the machine showed an inversion of varying magnitude all night at a distance of 270 feet southeast of the machine. The inversion was never destroyed at this point. This is not in agreement with data previously collected in a citrus nursery. At Lake Garfield Nursery, Babson Park, during the 1957-58 season the strata to the height of the machine was very nearly isothermal while the machine was operating. However, the machine at Babson Park Nursery is twice as powerful as the one studied in the Andre grove.

The roughness factor of a grove as compared to a nursery must also be considered. Nevertheless, this machine had a beneficial influence out to at least 330 feet east and 270 feet southeast as is shown in the graphs. Furthermore, the inversion was reduced as it was constantly 8 to 10 degrees in the outside check area. Heavy frost covered adjacent areas that were not fired, but frost was light and confined mostly to the soil in the machine area. Trees were wet and showed some evidence of widely scattered, very light frost.

#### CONCLUSION

The results of studies, limited by lack of cold weather this season, substantiate earlier conclusions partially but not fully. Those conclusions were the machines provided most protection when: (1) wind was calm (little or no protection as the wind increased above 6 MPH), (2) a good inversion existed (steady increase in temperature with height), (3) temperatures increased from below freezing at the surface to above freezing at the height of the machine.

Situations have existed this season that cast some doubt on the total reliability of (3). However, the discrepancies were most prominent in the mature grove. Here the machines did not destroy the inversion 270 ft. from the machine as effectively as anticipated with existing conditions. The stability of



the air to tree height was seemingly most difficult to break down on a few occasions. This could be due in part to the roughness factor created by the tall trees, and it may also have resulted from the distance between tower and machine.

However, it is becoming increasingly evident that another parameter in addition to temperature will have a very important affect on the mixing that can be accomplished by a machine. This parameter is the air density, and it is a function of specific humidity and atmospheric pressure as well as temperature. It is hoped that future investigations will not only add to our knowledge of the effectiveness of machines under different temperature profiles and wind conditions, but that more efficient use of the machines may result from the determination of the upper and lower limits of density gradient most suitable for optimum machine efficiency. When these limits are established it may be possible to control the density factor by means of selective heating.

We extend our thanks to Lake Garfield Nurseries, Bartow, Florida for the splendid cooperation given us during the seasons these investigations were in progress.

## 26TH CITRUS GROWERS INSTITUTE PROGRAM ANNOUNCED . . .

*Continued from page thirteen*  
**PROGRAM**

### Monday, August 10

2:00 to 6:00 p. m. Registration;  
6:15 supper; 8 o'clock entertainment.

### Tuesday, August 11

K. S. McMullen, Extension Service District Agent, in Charge, breakfast at 7:15; announcements at 8:30 a. m. with Jack T. McCown, Assistant Citriculturist, Presiding.

Invocation by Rev. Phil Padgett, Pastor, First Baptist Church, Eustis; welcome by Karl Lehmann, opening remarks by Dr. M. O. Watkins, Director, Agricultural Extension Service, Gainesville.

Managing and Care of Young Citrus Trees by Fred P. Lawrence, Citriculturist, Agricultural Extension Service.

Using the Murcott to its Best Advantage by Dr. William G. Long, Horticulturist, U. S. Department of Agriculture, Orlando.

Disease Problems with the Murcott by Dr. L. C. Koor, Associate Plant Pathologist, Citrus Experiment Station.

12:15 dinner followed by afternoon session at 1:30 with William H. Mathews presiding.

A Progress Report on Frost Prevention Studies at the University of Florida by Joe N. Busby, Assistant Director, Agricultural Extension Service.

Citrus Spray Oils by Dr. A. A. Whipp, California Spray Chemical Co., Orlando.

Where to Get Registered Citrus Trees by R. G. Pitman, Jr., President, Florida Nurserymen's Assn.

State Plant Board Regulations and the Citrus Grower - A Panel, with Dr. W. G. Cowperthwaite, Commissioner, Moderator. A group of Plant Board personnel will serve on the panel with Dr. Cowperthwaite.

### Wednesday, August 12

7:15 breakfast, 8:30 announcements, with R. E. Norris, Lake County Agricultural Agent presiding.

Rejuvenating and Thinning Some Old Citrus Trees by J. B. Norris, Lake County Grove Manager.

Close Spacing of Citrus to Reduce Production Costs by Zach Savage, Agricultural Economist, Florida Agricultural Experiment Station.

Hedging and Topping Citrus Trees in California by Paul W. Moore, Specialist, Horticulture Department, Citrus Experiment Station, Riverside, Cal.

Cold Hardiness Studies on Citrus in Florida, Texas and California by Dr. Wm. C. Cooper, Head, Citrus & Subtropical Fruit Section, USDA, Orlando.

12:15 Dinner followed by afternoon session at 1:30 with F. S. Perry, District Agent, Agricultural Extension Service, presiding.

Remarks on Present Citrus Production by J. C. Townsend, Jr., Agricultural Statistician, U. S. Crop Reporting Service, Orlando.

Advertising Plans of the Florida Citrus Commission for 1959-60 by Homer Hooks, Manager, Florida Citrus Commission.

Our Observations of the Aerial Application of Sprays and Dusts for Citrus - a Panel with James E. Brogdon, Extension Service Entomologist, Moderator. Members of the panel will be Harvey J. Sutton, Assistant Production Manager, Waverly Growers Coop; George McClure, Libby, McNeill, Libby; W. H. Gibb, Jr., Grower; Dr. W. Husmann, Apschawa Groves; R. C. Potter, Airplane Dusting Service, Zellwood; W. K. Price, III, Grower; Fred P. Lawrence, Citriculturist, Agricultural Extension Service, and Jas. H. Annear, Trans-American Helicopters, Inc., Orlando.

4:00 p. m. Adjourn for swimming, boating, fishing, etc. 6:15 supper and 8:00 recreation.

### Thursday, August 13

7:15 breakfast, 8:30 announcements, Henry Swanson, Orange County Agricultural Agent, presiding.

The Long Time Citrus Outlook by Dr. H. G. Hamilton, Head, Dept. of Agricultural Economics, U of F.

The Past, Present and Future of the Express Fruit Shipping Business by William A. Stubbs, Secretary, Manager, Florida Express Fruit Shippers Association.

Values of Various Sources of Nitrogen by Dr. Ivan Stewart, Associate Biochemist, Citrus Experiment Station.

Progress Report on Herbicides to Control Weeds in Citrus Groves by D. W. Kretchman, Asst. Horticulturist, Citrus Experiment Station.

### 12:15 Dinner

1:15 T. R. Townsend, Volusia County Agricultural Agent, Presiding.

Florida Citrus Mutuals Plans for 1959-60 by Vernon Conner, president.

What the Fresh Fruit Industry Wants by John T. Lesley, President Florida Citrus Exchange.

What the Concentrate Industry Wants by Dr. W. R. Roy, Vice-President in charge of Technical Services, Minute Maid Corp.

How to raise Quality Fruit, a panel with Fred P. Lawrence, Moderator.

Members of the panel will be the following:

By fertilization - Dr. Paul F. Smith, Plant Physiologist, USDA, Orlando  
By spraying - Dr. R. B. Johnson, Associate Entomologist, Citrus Experiment Station

By Using Maturity Sprays - Dr. E. J. Deszyck, Associate Horticulturist, Citrus Experiment Station

Rootstocks and Scions - Dr. F. E. Gardner, Principal Horticulturist, USDA, Orlando

Irrigation - Dr. L. W. Ziegler, Prof. of Citriculture, University of Florida

4:00 - Adjourn for swimming, boating, fish, etc. 6:15 supper, and at 8 recreation.

### Friday, August 14

7:00 a. m. Breakfast, institute adjourns.





# The Expanding Citrus Industry

At the beginning of the 1957-58 fruit season we were faced with an on-the-tree estimate of 144 million boxes of fruit. Our production was rapidly exceeding our marketing facilities and there was general pessimism in the industry that oranges would bring no more than \$1.00 on the tree. Certainly the whole crop would have been marketed, but not at the profitable prices of the past several years.

Then came the freezes beginning early in December and our entire situation was changed. The Florida orange crop was reduced 20% and this, coupled with the shortest California crop in 30 years, put the Florida citrus industry in a most favorable supply position as compared to the demand for its products.

The entire marketing outlook was changed almost overnight. Not only was the steady increase in the production of citrus abruptly halted, but also the all-out marketing effort of seeking new markets at profitable prices was changed to a policy of restricted sales at high price levels. The fear of over production and excessive carry-over inventories was definitely removed for the time being at least.

It is an ill wind that blows no good and certainly we learned some things from last winter's freezes that we had not realized before. We learned that an acceptable quality of concentrate can be produced from badly frozen fruit provided there is no fermentation in the fruit, and provided proper precautions are taken all along the line.

We also learned the important fact that citrus fruits are rapidly becoming a staple in the American diet and our customers will pay more for Florida citrus fruit and products than we ever thought they would. We learned very definitely that we have only ourselves to blame when we see our products at prices which at times in the past have been even cheaper than soda-pop.

Unfortunately, periods of restricted sales at high price levels bring about conditions that are not conducive to the overall program of an industry. It is necessary then that we recognize these conditions and some of the immediate problems created by them.

It is axiomatic that during a period of short supplies and high price levels there is a tendency to-

By J. R. GRAVES, Chairman  
Florida Citrus Commission

Paper Delivered at Gulf Coast Citrus  
Institute at Dade City

ward lower over all quality standards. Certainly this was true in all channels of our trade last season including all fresh and processed products. The return to products of the highest consumer acceptance is certainly one of our immediate problems. As stated above, a period of high prices not only results in a reduction in volume of sales, but, more important, results in a reduction in the customers using citrus. This reduction in the sales volume of citrus and loss of customers buying citrus in reality means a change in the buying habits of people because the per capita consumption of food remains about constant throughout the years.

This fact is emphasized by an article appearing in the October 1953 issue of Fortune Magazine from which I quote in part, "The United States is eating better than it ever has before, but not more in physical bulk - not on a per capita basis, at least. Americans are consuming today, almost exactly what they were in 1909 - the year the Agriculture Department estimates of consumption began. In 1909 the figure was 1576 pounds of food per capita; in 1952 it was estimated 1578 pounds. The desire for food is limited in every man by the narrow capacity of the human stomach."

The problem of marketing citrus becomes in fact very keen competition for space within the limits of the human stomach. We not only expect continued competition for space from other fruits and juices, but must expect vigorous competition from new ades, blends, powders, etc., some of which are fortified with synthetic vitamins costing only a fraction of the vitamins from natural sources.

All of the aforementioned problems add up to one significant thing which is marketing troubles in the future unless careful planning towards right decisions are made now. So what is some of the planning that we should be doing to resolve these problems?

In facing up to our problems, it must be realized that the potential

supply of citrus available for sale cannot be varied to meet changing conditions of demand as in manufactured products. For example, if too many automobiles are produced in one period, production can be cut back during the next period in order to bring demand and supply more in balance. But not so with citrus.

Citrus trees set today commit us to a course of marketing problems five to ten years hence. Barring future catastrophies of nature, we are only a few years away from a situation where our production will again be growing faster than our developed marketing facilities. This simply means that our present markets must be expanded if we are to market such crops at profitable prices.

It is urgent then that we plan now to increase the future potential consumption of citrus which I think can be done in the following three ways:

(1) Expansion of our export markets. Our export potential is of course important and should be exploited to the fullest, but the potential is limited because of the distances involved, lack of facilities in foreign countries to handle some of our products, competition from other producing areas and other reasons.

(2) Education of the increased population to the use of citrus.

This is estimated to provide a new potential market for 2,000,000 boxes a year. While certainly this is important, it is not sufficient to provide for the annual rate of increase in citrus production that we have known in the past.

(3) Broadening the total market for and uses of citrus in varying forms.

I feel that our biggest opportunity

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is in broadening the total market for citrus. We need to give a lot of hard thinking to the job of selling, which involves advertising, merchandising, pricing and distribution. Every shipper and processor in the industry has a job to do here, and the Commission is no less responsible through its advertising and merchandising programs.

The Commission's advertising programs are long range and particularly valuable because they are designed to induce in the consumer a buying habit, growing out of his deep-seated knowledge of the daily need for the health values contained in citrus fruits and juices. This produces a cumulative effect which underlies the sales effort of every shipper and processor. We should plan to continue to make searching appraisals of advertising and merchandising programs so that they are geared for some steep climbs in production ahead.

All of our outlets of distribution must be invigorated with a fresh new effort to grow. Fresh fruit sales, canned juices, chilled juices, concentrates, and all other forms of citrus products must push forward in a maximum effort of hard-hitting, smart selling.

We must accelerate and augment our research programs. We must continue to search for new cultural practices with particular emphasis on those practices affecting internal and external qualities. Increased efforts should be made towards developing profitable by-products and especially in developing new products for human consumption. It is interesting to note here that of the products now handled by General Foods, 40.6 per cent are new products that were not handled ten years ago.

Renewed efforts should be placed on developing new methods, and improving present ones, of processing and handling citrus from the grove to the ultimate consumer. Better techniques for determining and checking maturities and grades and improved processing procedures surely must come in for their share of a stepped up research program.

Our research program must be geared to the needs of industry. It is the responsibility of the industry to keep our research people fully informed as to its needs.

Quality, of course, must be paramount from the grove to the consumer. It is perhaps the most precious attribute a food product can have. However, the temptations of economic short-cuts are tremendous and the pressure of com-

petition is overwhelming, but the long range benefits of known integrity for high quality are priceless and permanent. We should ever be alert to these temptations and remember that Mr. and Mrs. Consumer are the final inspectors and judges of our products.

There has been some concern recently that fruit sold in fresh form has not kept pace with the growth of the industry. Since about 30% of our entire fruit crop is now being marketed through fresh fruit channels it goes without saying that this concern is justified. It is doubly important because there is no carry-over inventory of fresh fruit from year to year. It is consumed in the same year that it is produced. I would hate to think of the chaotic condition that would result if all fruit marketed in fresh form was suddenly added to the amount not being processed.

Until markets could be developed, carry-over inventories would seriously affect sales for several years to come. It is certain then that fresh fruit is a most important marketing outlet and we must not only keep it in a strong and healthy position, but make every effort to expand it to its fullest potential.

Examining the records since the 1949-50 season and excluding last year because of the freezes, fresh grapefruit sales have continued at about 50% of the total grapefruit crop. Fresh oranges, however, have not maintained their position as compared to total orange production. While the total number of boxes marketed each year remained relatively the same, shipments dropped about 15% as compared to total orange production.

What then has happened to fresh oranges that they have not kept pace with over-all industry growth when every consumer survey indicates that there is no substitute for high quality fruit in the fresh form.

First, the advent of orange concentrate with its convenience for

the housewife, reasonable good quality and availability during 12 months of the year has instilled buying habits that are difficult to overcome. The emphasis on pounds solids by the concentrate industry has caused most of us to move our fruit with high sugar content and correspondingly above average internal quality into concentrate channels while our oranges with lower fruit solids and correspondingly lower internal quality has been marketed through fresh fruit cannels.

Grapefruit does not lend itself to concentrate purposes as oranges do and I believe that this is probably the fundamental reason that grapefruit has maintained its position in the fresh fruit market. The increased costs in packing, transportation, selling, etc., have all contributed to the trouble of the fresh fruit industry. Commission merchandising men have recently reported unusual problems with poor quality. While some of this may be attributed to the general character of the fruit this season, it might also be a laxity in the fresh fruit industry.

I think that it is urgent that we start now with a searching appraisal of our entire fresh fruit procedures. Time does not suffice to go into each in detail, but certainly it should include harvesting procedures, grades and grading procedures, packing and packaging procedures, marketing and market analysis, decay control, maturity standards, etc.

The Florida Citrus Commission is not oblivious to the problems of the fresh fruit industry and as its Chairman, I would like to mention briefly some of the things that we are doing and also plan to do to augment this valuable part of our industry.

Rind breakdown, especially on oranges has been a big problem for several years. The Commission Research staff instigated work about 2 years ago on the causes and prevention of breakdown. Many times rind breakdowns occur after fruit

*Continued on page twenty-two*



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## Reports Of Our Field Men . . .

### NORTH CENTRAL FLORIDA

V. E. Bourland  
Winter Garden, Fla.  
Phone 107

Weather has been dry and hot, at this writing it is cloudy, but not much rain yet, hope to get some as it is badly needed. Some growers have their irrigation pipes out ready for use. Young trees have been watered regularly for past two weeks. Most growers have their summer application of fertilizer on, and are busy with summer spraying. Old groves in general look very good, and more fruit showing up as time goes by, but no June bloom to speak of as yet, which growers were hoping for.

Truck farmers and melon growers are about finished up with their crops. Seems that most of them that kept working made a little money or at least expenses. They had extremely bad weather conditions.

### NORTH CENTRAL FLORIDA

L. D. Geiger, Jr.,  
Phone STATE 7-3952  
Leesburg, Fla.

June finds the citrus growers in north central Florida finishing the summer application of fertilizer and preparing for the summer spray application. The fruit is generally beginning to size up considerably.

The truck farmers are beginning to wind up the year's operation for the summer. Also, most of the watermelon growers will soon finish with the last of their cutting.

The pastures in this area are beginning to look very good and it looks as though, if the cattle market holds up, it will pay the cattlemen to spend some money keeping the grass crop in good shape.

### HIGHLANDS AND POLK COUNTIES

R. E. Lassiter, Jr., & R. S. Carlin  
P. O. Box 1304  
Winter Haven, Fla.

With the completion of the Summer fertilizer application we have received way above the average rainfall in this area, and the trees

are making another excellent growth at this time.

Young trees should be receiving fertilizer throughout the Summer months to insure maximum growth. We have noticed in the past few weeks that rust mite populations have been increasing rapidly and many growers are going ahead a little early with their Summer scalicide and Zineb to control these mite populations. We have also noticed heavier scale populations than we would like to see following last Winter's Parathion applications. We cannot emphasize too strongly that a thorough application be made when applying these sprays.

Growers will soon be busy applying Dolomite where it is necessary. It is very important to keep the pH values where they belong in order that the trees can benefit more fully from the fertilizer which has been applied.

### SOUTH HILLSBOROUGH, MANATEE AND SARASOTA COUNTIES

Eaves Allison  
P. O. Box 365, Sarasota, Fla.  
Phone Fulton 8-2611

No citrus bloom showed up in May in this area, and the June bloom is a normal scattering one — so — it looks like those trees which skipped their usual spring flowering will have a rest this year. However, when coloring-up time comes along there are always a few more fruit in evidence than was expected. They hide!

May was short of moisture in some areas here, and gave up plenty of rain in others. On the whole citrus groves have set and carried their crops well, and young plantings are producing very fine flushes of new growth in response to regular applications of that good Lyons fertilizer.

Soft brown and Florida red scale have been pretty active on some young stuff, but evidences of other damage has been minor.

The vegetable growers are rounding up their equipment and taking a breather, but new land clearing operations are grinding on. Pasture grasses are lush, and the acreage of really improved grazing area is impressive.

### SOUTH POLK, HIGHLANDS, HARDEE AND DE SOTO COUNTIES

C. R. Wingfield  
Phone: Glandale 2-8181  
Avon Park, Fla.

The heavy rains during middle of June has assured all of this area of a good moisture condition. However, some low land groves are rather wet but the sand hill groves are enjoying every drop of it. With the flush of growth we are getting some bloom but would not consider it general.

The citrus trees are in good condition and the fruit sizing is what would be expected with ideal moisture. While the size of the new crop looks better than two months ago we do not consider early or midseason fruit up to normal. Valencias still look good both from the standpoint of quantity and quality. The old Valencia crop has just about gone. The movement is slower each day.

Fruit buyers have been active since bloom time and a good many large sales have been made at a satisfactory figure. The 1958-59 pick-out figures have had very little effect on new purchases.

The summer fertilizer application has been completed and the grower's attention has turned to his oil spraying. By the time this is finished it will be time for another feeding for non-bearing trees. This should be done at regular 60-day intervals during summer with last application in early September to allow new growth to harden before cold weather.

### HILLSBOROUGH PASCO AND SUMTER COUNTIES

C. W. Dean  
Gibson, Fla.  
Phone Tampa 40-2592

Citrus trees have been given their summer application of fertilizer and the trees are responding well. The fruit are sizing very good.

Some growers have begun to apply their oil spray already, with the addition of zineb for rust mite control. From all indications, we will have another prosperous citrus year as for yield and quality, which can be had from the use of our good ole' Lyons fertilizer.

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### Uncle Bill Says:

*They is folks who sometimes indicate they think I ain't right in the head, mostly 'cause I said once that the prices we bin gettin' fer our citrus fruit the past couple of years, gives us a heap bigger percentage over the cost of production than is the case in most businesses.*

*Fact of the matter is they ain't no one who kin deny that fact . . . and it makes us mighty happy that this is the case, 'cause we happen to git our livin' out of producin' citrus fruit, and what we said about our percentage over production costs wasn't no complaint . . . seemed to us it was simply the statement of a very happy condition so fur as most of us citrus growers is concerned.*

*Fer a long, long time folks who should know has kept harpin' on the need for us growers to produce the very highest quality of citrus fruit it is possible to raise . . . 'n that statement is more true today than it has ever bin before. What with high grade groves sellin' fer \$4,000 per acre and more it certainly is smart management fer us to raise the best fruit that proper feedin' and cultivatin' can enable us to raise on this high priced land.*

*Then, too, the folks who is buyin' citrus fruit today is a heap more choosy about the quality of the fruit and vegetables they buy than once was the case. They figger now, and rightly so, that when they put out their good money fer fruit they ought to git the very best that the market affords.*

*This business of gettin' the best possible fruit fer market ain't near the chore it was 40 or 50 years ago . . . jist like we bin sayin' fer a long, long time . . . Lyons Fertilizers Produce Maximum Crops of Finest Quality.*

## THE EXPANDING CITRUS INDUSTRY

*Continued from page nineteen*

has been packaged. Work is also being done to determine if certain chemical or dyes can be used that will clearly indicate the fruit that will break down so that they can be eliminated before it is packed.

I understand dyes of this nature are now being used successfully by potato industry. Work is continuing to increase the shelf life of fresh fruit which includes treatment for decay control such as biphenyl Dowicide A and Hexamine, fungicidal waves, etc. Packing houses processes are in for their share of study which include the new hydra-cool process, coloring room procedures, storing and shipping of fruit under varying degrees of refrigeration, etc.

We need to know more about grading techniques and consumer preferences. A market survey is now in progress to determine consumer attitudes towards discolorations, texture, shape and weights of grapefruit. A study is also under-way to attempt to determine consumer preferences as to color-add as opposed to natural color oranges. These surveys are only the beginning and I am sure others will follow as the needs arise.

And now we are on the threshold of a new and promising era for Florida citrus. I've sensed this, because of the earnestness of the efforts of a great many people during the past few years. My colleagues and the many hundreds of industry people with whom I have talked, concur.

In my opinion, there is more har-

mony, direction and clearly defined purpose in the industry today than at any period of our rather turbulent history. Let me briefly illustrate.

As stated previously, the fresh fruit segment of our industry has not kept pace with total industry growth. The Commission took note of this alarming trend and asked fresh fruit officials to appraise the situation and recommend ways in which it might be corrected. As recently as last Tuesday, after a series of meetings and working sessions, these fresh fruit men came up with about 10 shirt-sleeved proposals which could well solve many of their problems.

They recommended, mainly, that fruit sizing standards be changed, some shipping containers be eliminated, the possibility of requiring all shipments to be protected with decay inhibitors, and the conduct of cost studies in order to encourage growers to grow better fruit for the fresh market. This is real progress—cooperative and forward-looking.

Another indication of harmonious strides being made by the industry is a package of legislation which appears to be headed for successful passage in the legislature. Most of the bills deal with raising quality standards all along the line. One specifically allows the Commission to raise finished product requirements. Another raises by a half point the ratio on all round oranges, including Temples.

Progress? Yes. But we must not be complacent and content to rest on our laurels now. To each of you, whether you be grower, handler or processor, goes the responsibility of doing your part so

that this march of progress continues. It's well and good to raise large volumes of citrus fruit, but unless we can sell it at a reasonable profit, we're facing internal chaos and marketing suicide.

Raising quality fruit and packing high grade products will form a stout foundation for our forward progress. Strong and aggressive advertising and merchandising, broadening of markets, plus earnest and intelligent research will assure continued prosperity and well-being of our industry.

In this, we can all participate together.

## CLEANING FURNITURE

If your furniture has collected wax, dirt and oil until the natural beauty is hidden, you can restore its sheen by using the following mixture, says Mrs. Edwena J. Robertson, assistant home demonstration agent.

Mix 1 tablespoon of boiled linseed oil (be sure the label says boiled), 1 tablespoonful vinegar, 1 tablespoonful turpentine, and 1 pint hot water. Wipe the mixture, while hot, on furniture, cleaning a small area at a time. Wipe off and dry. Polish with a wool cloth, then wax with a paste wax for protection and shine. If this does not restore the furniture, repeat the process or refinish the furniture.

## OLSON RE-ELECTED

John L. Olson of Haines City, well known Florida banker, has been re-elected to his ninth term as president of the Growers Loan and Guaranty Company, according to an announcement by the Florida Citrus Exchange.

The Growers Loan and Guaranty Company, holding its 43rd annual meeting recently, also returned James Samson of Tampa as executive vice president and treasurer, and Counts Johnson, Tampa attorney, as secretary and General Counsel.



**QUADRICENTENNIAL EXHIBIT** — Florida's vegetable and tropical fruit production is represented at the Florida Quadracentennial Festival at Pensacola with this factual display showing varieties and methods of harvesting and shipping. The display points out that most Eastern and Northern markets are within 36 hours shipping time from Florida which results in fresher vegetables and fruits for the consumer. The display was prepared under the direction of the Florida Fruit & Vegetable Association.

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## Citrus Nursery Site Approval Makes Headway

From The  
PLANT BOARD BULLETIN

The citrus nursery site approval plan is gaining headway in Florida with a total of 793 sites now accredited by the State Plant Board.

Purpose of the program is to eliminate one of the principal sources of spreading decline in commercial citrus. Research has pinned considerable blame on nursery stock for the accelerated movement of decline thru the state's citrus belt. Site approval is expected to eradicate the nematode from those nurseries where the pest is present and to prevent movement to nurseries that are nematode-free.

### Uninfested Barriers

The plan calls for removal of the nursery planting site from all possible nematode which causes spreading decline. That is to be accomplished through the establishment of barriers of uninfested acreage between planting sites and the threat of infested plants and those which are considered prime hosts of the nematode.

Prior to February, 1958, citrus nursery stock could be grown as near as 50 feet to an infestation. Site approval has changed all that with minimum distances now ranging from 100 to 400 feet.

No minimum is required from certain trees immune to the burrowing nematode or from a healthy citrus grove which is 15 years old or older, provided there are no visible signs of spreading decline in the grove and random samples from the four nearest rows of trees divulge no evidence of the nematode. Any replants in the acceptable healthy grove which are within 400 feet of the proposed site must have been in place five years or more, or must have received burrowing nematode certification before movement from a nursery into the grove.

### Site Possibilities

A young grove which meets all requirements otherwise may be approved as a nursery site when it is known that the grove trees were inspected for burrowing nematode and found negative before being moved from a nursery.

Nurseries established before February, 1958, may receive site approval if the site meets qualifications and history of the site and of plants brought onto it are known to be satisfactory. If appropriate distances are observed, infested or suspect areas

may receive site approval when properly fumigated under supervision of authorized inspectors and the land kept fallow for six months.

Proper procedures must be followed after all approvals in order to prevent sites from being disqualified.

### Hot Water Treatment

All citrus nursery plantings made on unapproved sites or on approved sites which later become disqualified must be hot water treated before movement from the property.

In the selection of sites for new nurseries, only virgin land or land where certain domesticated perennials have ever grown are acceptable. If there is any reason to suspect the area, then root samples must be collected from available host plants and examined. If the site proves negative, then fumigation and the fallow-period treatment are necessary for approval.

## 100 BOYS ENROLL FOR 4-H CITRUS INSTITUTE AT CAMP CLOVERLEAF

Over 100 4-H Club boys from 17 Florida counties have registered for the Fourth Annual Junior Citrus Institute at Lake Placid July 20-24.

This is a substantial increase over last year's participation, according to William Mathews, assistant horticulturist with the Florida Agricultural Extension Service.

The one-week school is operated to benefit 4-H Club boys interested in Florida citrus. The course is open to any 4-H Club boy with a good club record.

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